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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,540	01/15/2004	Dong-kee Sohn	249/441	3055
27849	7590	12/22/2006	EXAMINER	
LEE & MORSE, P.C. 3141 FAIRVIEW PARK DRIVE SUITE 500 FALLS CHURCH, VA 22042			DO, AN H	
			ART UNIT	PAPER NUMBER
			2853	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		12/22/2006	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/757,540	SOHN ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	An H. Do	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2006.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 20 is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### DETAILED ACTION

The Amendment filed on 13 October 2006 has been acknowledged.

#### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 6-10 and 13-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Pilosof et al (US 6,474,783).

Pilosof et al disclose the following claimed features:

Regarding claim 1, an ink-jet printhead (Figure 2B, element 16), comprising: an ink chamber (30) to be filled with ink and an ink channel (47) to supply the ink chamber with ink (17), the ink chamber (30) and the ink channel (47) formed in a passageway plate (including elements 48, 50, 52, 54); a cover plate (58) provided on the passageway plate; an ink ejection hole (32) formed through the cover plate (58) at a position corresponding to the ink chamber (30); a condenser lens (Figure 2B, lens 14) provided on a bottom surface of the passageway plate at a position corresponding to the ink chamber (30); and laser beam irradiating means (10) for irradiating a laser beam (36) through the condenser lens (14) and directly onto the ink contained in the ink chamber (30), wherein a surface of the ink is vibrated by a pressurized wave generated by the laser beam (36), and a vibration causes an ink droplet (38) to be expelled

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through the ink ejection hole from the surface of the ink (column 5, lines 39 to column 6, line 2).

Regarding claim 6, further comprising: a lens plate (14) provided on the bottom surface of the passageway plate, the lens plate including the condenser lens (14).

Regarding claim 7, wherein the laser beam irradiating means is a semiconductor laser (10).

Regarding claim 8, wherein the condenser lens (14) is convex shaped (Figure 2B).

Regarding claim 9, wherein the ink chamber (30) is a plurality of ink chambers (even though only one chamber is shown) positioned at predetermined intervals in the passageway plate, the ink ejection hole is a plurality of ink ejection holes (32), each formed at a location corresponding to one of the plurality of ink chambers (30), and the condenser lens is a plurality of condenser lenses (Figure 7, elements 72), each formed at a location corresponding to one of the plurality of ink chambers (30).

Regarding claim 10, wherein the laser beam irradiating means comprises: a semiconductor laser (10) for selectively irradiating the plurality of ink chambers; and a light path controller (control unit 9) for controlling a path of a laser beam (36) emitted from the semiconductor laser (Figure 2B).

Regarding claim 13, wherein the ink ejection hole (23) has a shape selected from the group consisting of circular, oval and polygonal (Figures 3 and 4).

Regarding claim 14, wherein the ink ejection hole (32) is sufficiently large to prevent contact between the ink droplet being expelled and the cover plate (Figures 3 and 4).

Regarding claim 15, a method of expelling ink, comprising: filling an ink chamber (30) with ink; irradiating (10) a laser beam (36) onto the ink (17) contained in the ink chamber (30) to generate a pressurized wave in the ink and vibrating a surface of the ink using the pressurized wave; and expelling an ink droplet (38) from the surface of the ink (17) by the vibration of the surface of the ink (column 5, lines 39 to column 6, line 2).

Regarding claim 16; further comprising: converging the laser beam (36) using a condenser lens (14) before irradiating the laser beam (36) onto the ink.

Regarding claim 17, wherein the laser beam (36) has a sufficiently high energy and is irradiated onto the ink for a sufficiently short period of time to prevent boiling the ink (column 6, lines 3-7).

Regarding claim 18, wherein the ink chamber (30) is a plurality of ink chambers (even though only one chamber is shown) and irradiating (14) the laser beam (36) onto the ink comprises: selectively irradiating (14) the laser beam (36) onto ink contained in one or more of the plurality of ink chambers (Figure 2B, control unit 9).

Regarding claim 19, wherein the ink droplet (38) expelled through the ejection hole (32) includes ink existing in a liquid state (Figure 3 shows droplet 38 is in a liquid state).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pilosof et al (US 6,474,783) in view of Nemoto et al (US 5,713,673).

Pilosof et al disclose the claimed invention except for reciting the following claimed features:

Regarding claim 2, wherein the passageway plate is formed of a silicon substrate that is transparent with respect to an infrared ray.

Regarding claim 3, wherein the laser beam irradiating means is an infrared laser.

Regarding claim 4, wherein the passageway plate is formed of a glass substrate.

Regarding claim 5, wherein the condenser lens is integrally formed with the passageway plate.

Nemoto et al teach the following features:

Regarding claim 2, wherein the passageway plate is formed of a silicon substrate that is transparent with respect to an infrared ray (column 2, lines 16-17).

Regarding claim 3, wherein the laser beam irradiating means is an infrared laser (column 2, line 13).

Regarding claim 4, wherein the passageway plate is formed of a glass substrate (since passageway plate is transparent, it's inherent to have it made from glass).

Regarding claim 5, wherein the condenser lens is integrally formed with the passageway plate (Figure 19 when everything is assembled).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the passage plate formed of a transparent silicon substrate with which the condenser lens is formed, as taught by Nemoto et al into Pilosof et al, for the purpose of proving the laser beam through the substrate.

5. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pilosof et al (US 6,474,783) in view of Yi et al (US 6,582,058).

Pilosof et al disclose the claimed invention except for reciting the cover plate is a silicon substrate and has a hydrophobic surface.

Yi et al teach that the nozzle plate is a silicon substrate and has a hydrophobic surface (column 3, lines 30-33).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the cover plate made of a silicon substrate and has a hydrophobic surface, as taught by Yi et al into Pilosof et al, for the purpose of preventing the nozzle clogging (column 3, lines 34-36).

***Allowable Subject Matter***

6. Claim 20 is allowed over prior arts.

The following is an examiner's statement of reasons for allowance:

The primary reason for the allowance of claim 20 is the inclusion of the method step of controllably energizing ink in an ink chamber to generate a pressurized wave on the surface on ink increases and to cause a liquid ink droplet to be expelled away from

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the surface of the ink before the ink reaches a boiling state by limiting an amount of energy being supplied directly to the ink. It is this step found in the claims, as it is claimed in the combination of, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Arguments***

7. Applicant's arguments filed 13 October 2006 have been fully considered but they are not persuasive. Applicant argued that Pilosof et al failed to disclose laser beam irradiating means for irradiating a laser beam through a condenser lens and directly onto the ink contained in the ink chamber as claimed in claims 1 and 15. However, this argument is not found persuasive because the laser source 10 in Figure 2B of Pilosof et al passes through the condenser lens 14 and then directly onto the ink contained in the ink chamber 30. Therefore, this limitation is taught and disclosed by Pilosof et al and the above rejection is maintained.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Information***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to An H. Do whose telephone number is 571-272-2143. The examiner can normally be reached on Monday-Friday (Flexible).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on 571-272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AD  
December 20, 2006



An H. Do  
Primary Examiner  
Art Unit 2853